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4 SUSQUEHANNA RIVER BASIN
5 TRIBUTARY OF DRINKER CREEK, SUSQUEHANNA COUNTY

6 PENNSYLVANIA

ROSS POND DAM

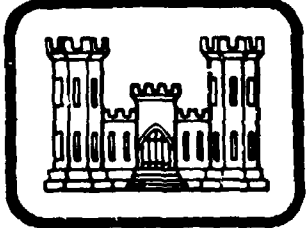
NDI I.D. PA-0265

DER I.D. 058-142

11 OWNER: MR. HOMER ROSS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PA CW 81-81-C-0014



PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

BY

D'APPOLONIA CONSULTING ENGINEERS

10 DUFF ROAD

PITTSBURGH, PA. 15235

AUGUST 1981

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation. However, the Phase I evaluation is intended to identify any need for such studies which would have to be undertaken by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection, as well as data made available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies. The size of the dam, its general condition, and the downstream damage potential are all considered in choosing the appropriate spillway design flood.

The assessment of the conditions and the recommendations were made by the consulting engineer in accordance with generally and currently accepted engineering principles and practices.

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A

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Ross Pond Dam
STATE LOCATED: Pennsylvania
COUNTY LOCATED: Susquehanna
STREAM: Unnamed primary tributary of Drinker Creek and a secondary
tributary of the Susquehanna River
SIZE CLASSIFICATION: Small
HAZARD CLASSIFICATION: High
OWNER: Mr. Homer Ross
DATE OF INSPECTION: March 23, 1981 and April 30, 1981

ASSESSMENT: Based on the evaluation of existing conditions, the condition of Ross Pond Dam is considered to be fair.

Although at this time no major sign of distress was noted, concerns exist as to the structural adequacy of the dam. As reported by the owner, the embankment material was placed by scrapers in lifts. It appears that no compaction was performed other than rolling of the material by scrapers. It also appears that no laboratory testing, engineering analysis and evaluation, or further testing were performed to assess the adequacy of the fill material for use in an impounding structure. Some surficial sloughs were observed along the downstream slope. Seepage areas were found below the toe of the dam near the left abutment.

Flow through the low level outlet pipe is reportedly controlled by an upstream valve submerged in the reservoir. Because the valve is not accessible and its operational condition is uncertain, the dam is not considered to have adequate emergency drawdown facilities.

According to the recommended criteria, small dams in the high hazard category are required to pass one-half to full Probable Maximum Flood (PMF). In view of the size of the dam and an evaluation of the downstream damage potential, one-half PMF was selected as the spillway design flood. An analysis showed that the existing spillway was capable of accommodating the spillway design flood without overtopping the dam. Therefore, the flood discharge capacity of the dam is classified to be adequate.

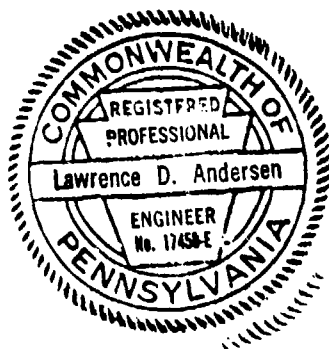
The following recommendations should be implemented immediately or on a continuing basis.

1. The owner should immediately retain a professional engineer for detailed evaluation of structural adequacy of the dam. The detailed evaluation of the dam should include but not be limited to subsurface investigation, materials testing, instrumentation and stability and seepage analyses.

Assessment - Ross Pond Dam

2. The ponded water at the toe of the dam should be drained and the toe inspected to ascertain the source of the water. Necessary measures should be taken to control seepage, if it exists.
3. The operational condition of the low level outlet system should be evaluated and necessary maintenance performed. If the low level outlet cannot be rendered functional, other means should be developed to drain the lake in the event of an emergency.
4. Brush and trees on the downstream face of the dam should be removed and the upstream slope should be provided with erosion protection.
5. Around-the-clock surveillance should be provided during unusually heavy rainfall or runoff events. In addition, a formal warning system should be devised to provide for alerting the downstream residents should emergency conditions develop at the dam.
6. The owner should develop and follow a formal operating and maintenance plan and should inspect the dam regularly.

Assessment - Ross Pond Dam



A handwritten signature in cursive script, reading "Lawrence D. Andersen", written over a horizontal line.

Lawrence D. Andersen, P.E.
Vice President

August 26, 1981

Date

Approved by:

A handwritten signature in cursive script, reading "James W. Peck", written over a horizontal line.

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

18 Sep 1981

Date

ROSS POND DAM
NDI I.D. PA-0265
DER I.D. 058-142
MARCH 23, 1981



Upstream Face



Downstream Face

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM
ROSS POND DAM
NDI I.D. PA-0265
DER I.D. 058-142

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. The inspection was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances. Ross Pond Dam consists of an earth embankment approximately 900 feet long (including spillway), having a maximum height of 26 feet above its downstream toe. The embankment crest width is irregular, varying from 20 feet to 30 feet. The upstream face of the dam is partially covered with scattered riprap and appears to be constructed on approximately a 2 horizontal to 1 vertical slope. The downstream slope is irregular with a general slope of 2 horizontal to 1 vertical. The lower portion of the downstream slope and the toe of the dam are covered with dense brush and small trees.

The spillway facility of the dam consists of an irregularly-shaped, open-channel spillway located near the left abutment. The spillway control section is not clearly defined and is partially eroded. Flow is discharged into a mound of large rocks at a distance of approximately 200 feet downstream. Beyond the rocks, discharge enters a natural stream bed. According to the owner, the low level outlet consists of a 24-inch-diameter reinforced concrete pipe which extends from the upstream toe to the downstream toe. Discharge through the pipe is controlled by a valve located on the upstream end of the pipe which is submerged. This outlet system constitutes the only emergency drawdown facility of the dam. Only the downstream end of the low level outlet pipe could be observed during the inspection.

b. Location. The dam is located on an unnamed primary tributary of Drinker Creek, a secondary tributary of the Susquehanna River, approximately three miles upstream from the confluence of Drinker Creek with the Susquehanna River, in Jackson Township, Susquehanna County, Pennsylvania (N41° 54.0', W75° 35.4'). Plate 1 shows the location of the dam.

c. Size Classification. Small (based on 26-foot height and 404 acre-feet estimated maximum storage capacity).

d. Hazard Classification. The dam is considered to be in the high hazard category. Approximately one mile downstream from the dam, Drinker Creek flows beneath State Route 92 and is then confined by a steep and narrow valley for about two miles before entering the rural residential and commercial areas of the town of Susquehanna near the confluence of Drinker Creek with the Susquehanna River. It is estimated that the basement level of most of the buildings in the potential damage area is within 10 to 15 feet of the stream bed. It is further estimated that failure of the dam could cause loss of more than a few lives and significant property damage in the downstream community.

e. Ownership. Mr. Homer Ross, Box 9A, North Jackson, PA 18847.

f. Purpose of Dam. Recreation.

g. Design and Construction History. No formal information is available concerning the design and/or construction of the dam. According to the owner, he completed construction of the dam around 1960. The dam was first inspected by the Commonwealth of Pennsylvania, Department of Environmental Resources, on August 8, 1980.

h. Normal Operating Procedure. The reservoir is normally maintained at the crest level of the uncontrolled spillway.

1.3 Pertinent Data. Elevations referred to in this and subsequent sections of the report were determined based on field measurements assuming the normal pool level to be at Elevation 1416 (USGS Datum). The normal pool level was approximated from the lake level shown on the USGS 7.5-minute Susquehanna, Pennsylvania quadrangle.

a. <u>Drainage Area</u>	0.98 square mile ⁽¹⁾
b. <u>Discharge at Dam Site (cfs)</u>	
Maximum known flood at dam site	Unknown
Outlet conduit at maximum pool	Unknown
Gated spillway capacity at maximum pool	Not applicable
Ungated spillway capacity at maximum pool	1284
Total spillway capacity at maximum pool	1284
c. <u>Elevation (USGS Datum) (feet)</u>	
Top of dam	1419 (measured)
Maximum pool	1419
Normal pool	1416

⁽¹⁾ Planimetered from USGS topographic maps. No other data available.

Upstream invert outlet works	Unknown
Downstream invert outlet works	1393 (measured)
Maximum tailwater	Unknown
Toe of dam	1393 ⁺
d. <u>Reservoir Length (feet)</u>	
Normal pool level	2300
Maximum pool level	2400 ⁺
e. <u>Storage (acre-feet)</u>	
Normal pool level	240(2)
Maximum pool level	404(2)
f. <u>Reservoir Surface (acres)</u>	
Normal pool level	51.4
Maximum pool level	58.3
g. <u>Dam</u>	
Type	Earth
Length	900 feet (including spillway)
Height	26 feet
Top width	Varies from 20 feet to 31 feet
Side slopes	Downstream: Varies from 3H:1V to 1H:1V Upstream: 2H:1V
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown
h. <u>Regulating Outlet</u> ⁽³⁾	
Type	24-inch-diameter reinforced concrete pipe
Length	Unknown
Closure	Valve ⁽³⁾
Access	Dam crest ⁽³⁾
Regulating facilities	None observed

⁽²⁾ Estimated based on the reservoir area.

⁽³⁾ Only the downstream end of the outlet pipe was observed during this inspection. No records or drawings are available; however, the owner reported the existence and operation of a regulating valve.

i. Spillway

Type

Irregularly-shaped,
unlined open channel
with an apparent
critical flow control

Length

145 feet (perpen-
dicular to flow)
60 feet (lower flow
section)

Crest elevation

1416

Upstream channel

Lake

Downstream channel

Irregularly shaped,
unlined open channel

SECTION 2
DESIGN DATA

2.1 Design

a. Data Available. The available data consist of files provided by the Commonwealth of Pennsylvania, Department of Environmental Resources (PennDER), which contain two aerial photographs and PennDER field inspection notes.

- (1) Hydrology and Hydraulics. No design information is available.
- (2) Embankment. No design information is available.
- (3) Appurtenant Structures. No design information is available.

b. Design Features

- (1) Embankment. No design information is available.
- (2) Appurtenant Structures. No design information is available.

c. Design Data

- (1) Hydrology and Hydraulics. No design information is available.
- (2) Embankment. No design information is available.
- (3) Appurtenant Structures. No design information is available.

2.2 Construction. The owner reported that the construction of the dam was completed around 1960. The dam was built by the owner who is an earth moving contractor. He noted that the embankment material was placed and rolled by scrapers. No reference was made to any engineering work related to the construction of the dam. No documentation is available concerning the construction of the dam.

2.3 Operation. There are no formal operating records maintained for this dam.

2.4 Other Investigations. None reported.

2.5 Evaluation. Available information is not considered to be sufficient to assess the structural or hydraulic adequacy of the dam. As noted previously, concern exists as to the structural adequacy of the dam. Further detailed engineering investigations are recommended.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The onsite inspection of Ross Pond Dam consisted of:

1. The visual inspection of the embankment crest and visible sideslopes, the abutments, and the downstream embankment toe.
2. The visual examination of the spillway and the visible portions of the outlet works.
3. The evaluation of the downstream area hazard potential.

The specific observations are illustrated in Plate 2.

b. Embankment. The visual inspection of the embankment consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, wet areas, seeps and boils, and observing general maintenance conditions, vegetative cover, erosion, and other surficial features.

In general, the dam is considered to be in fair condition. The two most notable conditions found at the dam were the presence of a surficial slough on the downstream face at the middle section of the embankment and indications of water seepage through the left half to one-third of the embankment.

The downstream embankment face was found to be irregular, which may have been caused by past slope movements. At least in two areas, at about the midheight of the dam, signs of sloughing were observed. Sloughing appeared to be surficial, caused by surface runoff. In these areas, the downstream face lacked vegetative cover. No seepage was found to be associated with the sloughs. The remaining portions of the downstream face of the dam are covered with brush and small trees. The upstream face was found to include scattered riprap. However, no significant shoreline erosion was evident.

A pond covering an area approximately 50 by 100 feet exists below the toe of the dam, left of the center of the embankment. According to the owner, the pond partially existed prior to the construction of the dam. The pond is fed by a spring and/or underseepage through the left abutment emitting approximately 50 feet downstream from the embankment toe. Some seepage discharging into the pond was found to be carrying fines, indicated by the accumulation of silt-like material along the edge of the pond. Total seepage into the pond was estimated to be in the range of 20 to 30 gallons per minute. Another seepage point was found

near the junction of the left abutment and the embankment. Seepage was clear and the rate was estimated to be in the range of 30 to 40 gallons per minute.

The crest of the dam was surveyed relative to the spillway crest elevation and was found to have a low spot which provides a freeboard of approximately 3.0 feet above the normal pool level. The measured dam crest profile is illustrated in Plate 3. The downstream embankment slope was surveyed and varies between 3 horizontal to 1 vertical and 2 horizontal to 1 vertical. The upstream embankment slope was measured to be 2 horizontal to 1 vertical. The upstream face is partially protected with riprap. However, no significant shoreline erosion was evident at this time.

c. Appurtenant Structures. The spillway structure was examined for signs of deterioration and other indications of distress which could cause blockage of the available discharge area. The spillway structure consists of an irregularly-shaped, unlined critical flow control section and an irregularly-shaped, unlined channel. At a distance of approximately 200 feet downstream from the control section, the discharge channel is filled with a mound of large rocks. However, it appears that this channel blockage would not affect the discharge capacity of the spillway due to the elevation difference between the top of the rock mound and the spillway crest.

The downstream end of the 24-inch-diameter reinforced concrete pipe was observed. The owner reported that flow through the pipe is controlled by a valve located on the upstream end of the pipe. Operation of the valve was not observed.

d. Reservoir Area. A map review indicates that the watershed is predominantly covered by woodlands. A review of the regional geology is included in Appendix F. Four small ponds are located upstream of Ross Dam.

e. Downstream Channel. Downstream from the dam, the discharge channel joins the natural stream which then flows through a relatively wide valley for most of its course before entering rural residential areas of the town of Susquehanna. Drinker Creek joins the Susquehanna River near the town of Susquehanna, Pennsylvania. A further description of the downstream area is included in Section 1.2 d.

3.2 Evaluation. In general, the dam was found to be in fair condition. The presence of ponded water along a portion of the embankment toe indicates the possibility of seepage through the dam. The ponded water should be drained and the embankment toe inspected for signs of seepage. The downstream face was irregular and sloughing at sections, raising concern about the continued stability of the dam. A detailed evaluation of the stability of the dam is recommended. Further, the owner is advised to locate the low level outlet valve and regulating mechanism in order to evaluate their present and future working condition. It is also advised that the upstream slope of the dam be provided with erosion protection.

SECTION 4 OPERATIONAL FEATURES

4.1 Procedure. There are no formal operating procedures followed at this dam. The reservoir is normally maintained at the uncontrolled open-channel spillway crest level and excess inflow discharges over the spillway.

4.2 Maintenance of the Dam. The dam is not formally maintained. The owner reported that he periodically inspects the dam and performs maintenance such as filling low areas and providing riprap on the upstream face on an as-needed basis.

4.3 Maintenance of Operating Facilities. The downstream end of the 24-inch-diameter reinforced concrete pipe was observed. The operating condition of the outlet pipe valve is unknown. It is reported that the outlet pipe valve (which is submerged) has not been operated since the initial filling of the reservoir.

4.4 Warning System. No formal warning system exists for the dam. Telephone communication facilities are available at the owner's home located along the lake shoreline.

4.5 Evaluation. While maintenance of the dam is considered to be fair, the operability of the outlet pipe and regulating equipment could not be evaluated. It is recommended that the owner ascertain the operational condition of the outlet facilities and perform any necessary maintenance to provide a working drawdown mechanism.

SECTION 5 HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Ross Pond Dam controls a drainage area of 0.98 square mile and impounds a reservoir with a surface area of 51.4 acres at normal pool level. The flood discharge facility of the dam consists of an irregularly-shaped, unlined open-channel spillway located near the left abutment. The capacity of the spillway was determined to be 1284 cfs, based on the available 3-foot freeboard relative to the low spot on the embankment crest.

b. Experience Data. As previously stated, Ross Pond Dam is classified as a small dam in the high hazard category. Under the recommended criteria for evaluating emergency spillway discharge capacities, such impoundments are required to accommodate floods ranging between one-half and full PMF. In view of the height and maximum storage capacity of the dam, which corresponds to the lower limit of the small size classification, one-half PMF was selected as the spillway design flood.

The PMF inflow hydrograph was determined utilizing the Dam Safety Version of the HEC-1 computer program developed by the Hydrologic Engineering Center of the U.S. Army, Corps of Engineers. Data used for the computer analysis are presented in Appendix D. The one-half and full PMF inflow hydrographs were found to have peak flows of 1433 cfs and 2866 cfs, respectively. The computer input and a summary of the computer output for the PMF analysis are included in Appendix D.

c. Visual Observations. On the date of inspection, no conditions were observed that would indicate that the capacity of the spillway would be significantly reduced in the event of a major flood.

d. Overtopping Potential. Various percentages of the PMF inflow hydrograph were routed through the reservoir and it was found that the spillway could accommodate approximately 50 percent of the PMF without overtopping the low spot on the crest of the dam. During the full PMF, the low spot on the crest should be overtopped for a duration of 3.8 hours with a maximum depth of 0.8 foot. This analysis is based on field measurements taken during the initial inspection of the dam on March 23, 1981. During a second inspection of the dam on April 30, 1981, it was found that the dam crest has been raised by one to two feet with additional fill placed on the crest.

e. Spillway Adequacy. Since the spillway can accommodate the spillway design flood of one-half PMF without overtopping the embankment, the spillway is considered to be adequate.

SECTION 6 STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

(1) Embankment. As noted in Section 3, although no major signs of distress were noted, field observations included an irregular downstream slope showing signs of sloughing and seepage and no reference was found to indicate that the dam was formally engineered. This raises questions about the continued stability of the dam. A detailed evaluation of the dam by a professional engineer is recommended.

(2) Appurtenant Structures. The unlined spillway overflow section and channel was found to be in fair condition, showing no significant erosion. However, the channel is irregular and may be subject to erosion during high flow conditions. The spillway facilities should be reshaped to provide a regular geometry and should be equipped with adequate erosion protection.

b. Design and Construction Data

(1) Embankment. No design and/or construction data are available to allow for an adequate assessment of the structural stability of the dam.

(2) Appurtenant Structures. No design and/or construction data are available to allow for an adequate assessment of the structural adequacy of the appurtenant structures.

c. Operating Records. None maintained.

d. Postconstruction Changes. None reported, although material was added to the embankment crest and downstream slope areas between the time of the two inspections.

e. Seismic Stability. The dam is located in Seismic Zone 1. In view of the concerns that exist relative to the static stability of the dam, the seismic stability is also considered to be questionable. The seismic stability of the dam can be reassessed in conjunction with further investigation and evaluation of the static stability of the embankment.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Assessment. The visual observations indicate that the Ross Pond Dam is in fair condition. Although no major signs of distress were noted, the dam was not formally engineered. The downstream slope is irregular and some sloughing was observed. Thus, questions exist as to the continued stability of the dam. A detailed evaluation of the stability of the dam is recommended. In conjunction with this work, the pond below the toe of the dam should be drained to inspect this area for possible seepage. Further, an investigation for means to control the existing seepage through the left abutment should be made.

The flow control mechanism for the low level outlet pipe is reportedly submerged and has not been operated since the completion of the dam. Therefore, the operational condition of this appurtenance is unknown.

According to the recommended criteria, small dams in the high hazard category are required to pass one-half to full Probable Maximum Flood (PMF). In view of the size of the dam and an evaluation of the downstream damage potential, one-half PMF was selected as the spillway design flood. An analysis showed that the existing spillway was capable of accommodating the spillway design flood without overtopping the dam. Therefore, the flood discharge capacity of the dam is classified to be adequate.

b. Adequacy of Information. The available information, in conjunction with visual observations, is considered to be sufficient to make a Phase I evaluation.

c. Urgency. The following recommendations should be implemented immediately or on a continuing basis.

d. Necessity for Additional Investigations. The owner should retain the services of a professional engineer to initiate detailed investigations of the stability of the dam. In conjunction with this work, spillway structures should also be evaluated to provide formal spillway facilities.

7.2 Recommendations/Remedial Measures. It is recommended that:

1. The owner should immediately retain a professional engineer for detailed evaluation of structural adequacy of the dam. The detailed evaluation of the dam should include but not be limited to subsurface investigation, materials testing, instrumentation and stability and seepage analyses.

2. The ponded water at the toe of the dam should be drained and the toe inspected to ascertain the source of the water. Necessary measures should be taken to control seepage, if it exists.
3. The operational condition of the low level outlet system should be evaluated and necessary maintenance performed. If the low level outlet cannot be rendered functional, other means should be developed to drain the lake in the event of an emergency.
4. Brush and trees on the downstream face of the dam should be removed and the upstream slope should be provided with erosion protection.
5. Around-the-clock surveillance should be provided during unusually heavy rainfall or runoff events. In addition, a formal warning system should be devised to provide for alerting the downstream residents should emergency conditions develop at the dam.
6. The owner should develop and follow a formal operating and maintenance plan and should inspect the dam regularly.

APPENDIX A
CHECKLIST
VISUAL INSPECTION
PHASE I

APPENDIX A

CHECKLIST VISUAL INSPECTION PHASE I

NAME OF DAM Ross Pond Dam COUNTY Susquehanna STATE Pennsylvania ID# DER: 058-142
 TYPE OF DAM Earth HAZARD CATEGORY High NDI: PA-0265
 DATE(S) INSPECTION March 23, 1981 WEATHER Partly Cloudy TEMPERATURE Mid-40's
 POOL ELEVATION AT TIME OF INSPECTION 1415.5± M.S.L. TAILWATER AT TIME OF INSPECTION N/A M.S.L.

INSPECTION PERSONNEL:

Bilgin Erel, P.E.

Wah-Tak Chan, P.E.

Arthur Smith

REVIEW INSPECTION PERSONNEL: (April 30, 1981)

L. D. Andersen, P.E.

J. H. Poellot, P.E.

Bilgin Erel, P.E.

Owner's Representative:

Mr. Homer Ross
(Owner)

Bilgin Erel RECORDER

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Surficial sloughing at midheight of dam at isolated areas.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	See Plate 3 for dam crest profile.	
RIPRAP FAILURES	Upstream slope has no riprap.	Erosion protection should be provided.

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No significant signs of distress.	
ANY NOTICEABLE SEEPAGE	Two seepage points and some wet areas along the downstream toe. See Plate 2 for location.	Need for controlling seepage should be evaluated.
STAFF GAGE AND RECORDER	None	
DRAINS	None	

VISUAL INSPECTION
PHASE I
OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None (only the downstream end of conduit observed).	
INTAKE STRUCTURE	Submerged, not observed.	
OUTLET STRUCTURE	24-inch-diameter reinforced concrete pipe with concrete endwall.	
OUTLET CHANNEL	Unlined discharge channel.	
EMERGENCY GATE	Reported regulating valve and operating cable submerged, not observed.	

VISUAL INSPECTION
PHASE I
UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	N/A - Spillway consists of an irregularly-shaped, unlined open-end channel with an apparent critical flow control section.	
APPROACH CHANNEL	Lake	
DISCHARGE CHANNEL	Irregularly-shaped, unlined open channel.	
BRIDGE AND PIERS	None	

VISUAL INSPECTION
PHASE I
GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

**VISUAL INSPECTION
PHASE I
INSTRUMENTATION**

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	

**VISUAL INSPECTION
PHASE I
RESERVOIR**

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Gentle. No significant shoreline erosion problems noted.	
SEDIMENTATION	Unknown	
UPSTREAM RESERVOIRS	A few small ponds.	

VISUAL INSPECTION
PHASE I
DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	There are no obstructions that would significantly affect the discharge capacity of the spillway.	
SLOPEC	No apparent slope instability immediately downstream from the dam.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	Drinker Creek flows under the main street of the town of Susquehanna three miles downstream from the dam. Numerous houses and buildings (about 5 to 10) are within the potential floodplain. Population: approximately 50.	

APPENDIX B
CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
AND HYDROLOGIC AND HYDRAULIC
PHASE I

APPENDIX B

CHECKLIST

ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM NDI: PA-0265

ID# DER: 058-142

ITEM	REMARKS
AS-BUILT DRAWINGS	None available.
REGIONAL VICINITY MAP	See Plate 1.
CONSTRUCTION HISTORY	Owner, Mr. Homer Ross, constructed facility in 1960.
TYPICAL SECTIONS OF DAM	See Plate 2 (sketch plan based on field observations).
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	None available.

**CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I**

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	None available.
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	None available.
BORROW SOURCES	Unknown
MONITORING SYSTEMS	No existing monitoring systems.
MODIFICATIONS	None reported other than the ongoing addition of fill materials to the embankment crest and downstream slope areas.
HIGH POOL RECORDS	None available.

**CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I**

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported.
MAINTENANCE OPERATION RECORDS	None available.
SPILLWAY PLAN SECTIONS DETAILS	See Plate 2 (sketch plan based on field observations).
OPERATING EQUIPMENT PLANS AND DETAILS	None available.

CHECKLIST
ENGINEERING DATA
HYDROLOGIC AND HYDRAULIC

DRAINAGE AREA CHARACTERISTICS: 0.98 square mile (woodlands)
ELEVATION, TOP OF NORMAL POOL AND STORAGE CAPACITY: 1416 (240 acre-feet)
ELEVATION, TOP OF FLOOD CONTROL POOL AND STORAGE CAPACITY: 1419 (404 acre-feet)
ELEVATION, MAXIMUM DESIGN POOL: N/A
ELEVATION, TOP OF DAM: 1419 feet

SPILLWAY:

- a. Elevation 1416 feet
- b. Type Irregularly-shaped, unlined open channel with an apparent critical flow control
- c. Width Irregular, undefined
- d. Length 145 feet (perpendicular to flow); 60 feet (lower flow section)
- e. Location Spillover Left abutment
- f. Number and Type of Gates N/A

OUTLET WORKS:

- a. Type 24-inch-diameter reinforced concrete conduit
- b. Location About center line of embankment
- c. Entrance Inverts Unknown
- d. Exit Inverts 1393± feet
- e. Emergency Drawdown Facilities Reported valve connected to cable extending to dam crest level. Operability unknown.

HYDROMETEOROLOGICAL GAGES:

- a. Type None
- b. Location N/A
- c. Records N/A

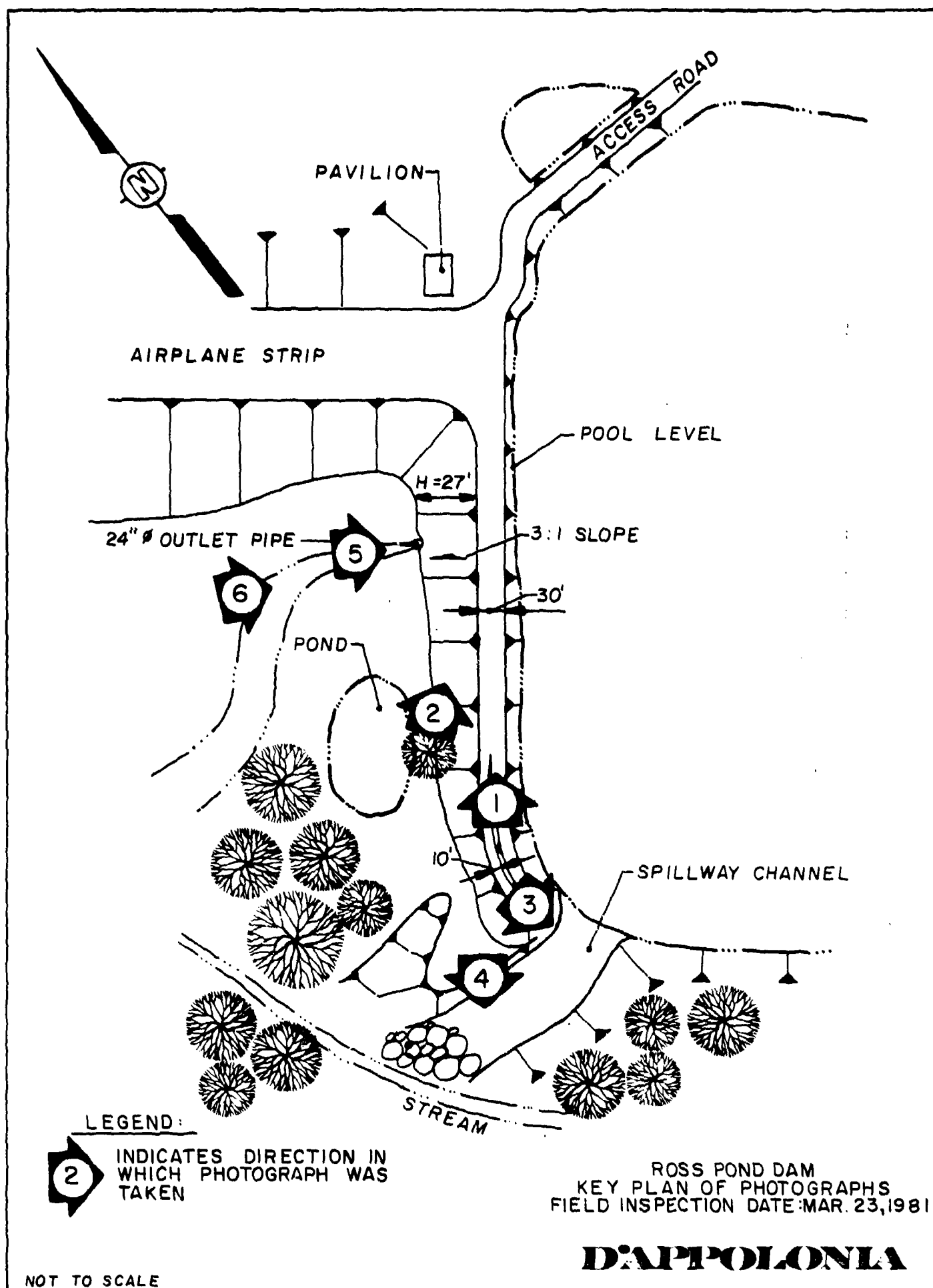
MAXIMUM NONDAMAGING DISCHARGE: Unknown

Note: Elevation Datum, USGS.

APPENDIX C
PHOTOGRAPHS

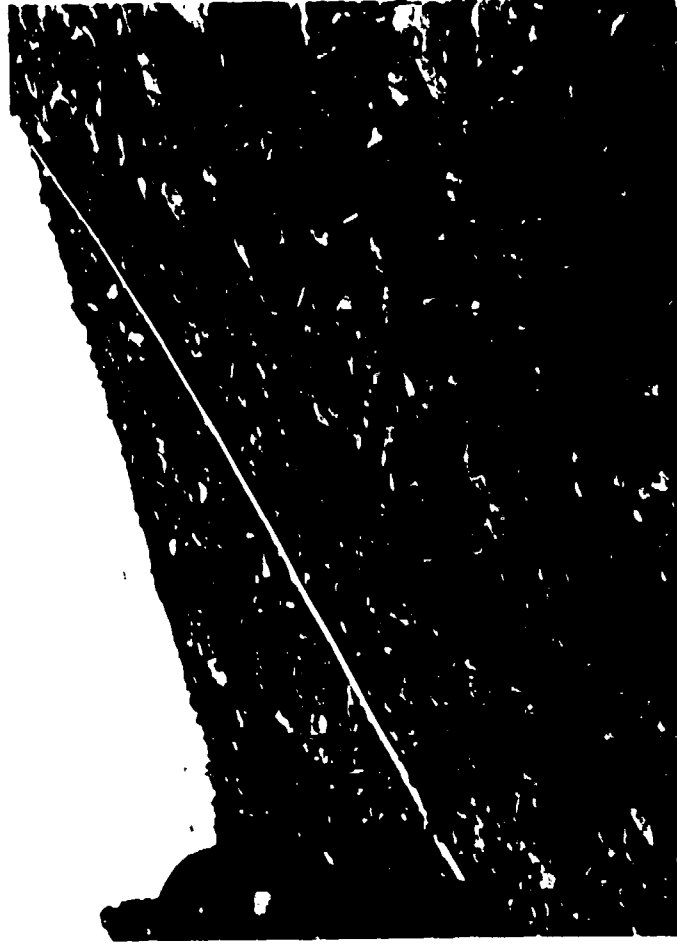
LIST OF PHOTOGRAPHS
ROSS POND DAM
NDI I.D. NO. PA-0265
MARCH 23, 1981

<u>PHOTOGRAPH NO.</u>	<u>DESCRIPTION</u>
1	Dam crest (looking northeast).
2	Downstream face of dam showing slope movement.
3	Spillway (looking south).
4	Spillway discharge channel.
5	24-inch-diameter outlet pipe exit.
6	Outlet pipe discharge channel.
7 & 8	Residential and commercial area of the Town of Susquehanna, Pennsylvania, located approximately 2.8 miles downstream from dam along Drinker Creek.





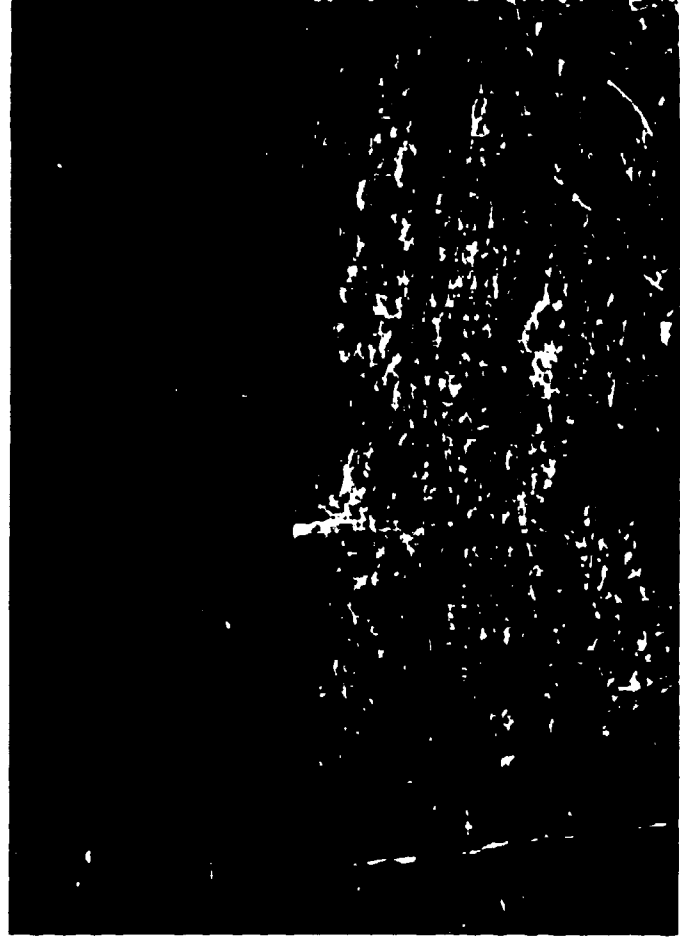
PHOTOGRAPH NO 1



PHOTOGRAPH NO 2



PHOTOGRAPH NO. 3



PHOTOGRAPH NO. 4



PHOTOGRAPH NO 5



PHOTOGRAPH NO. 6



PHOTOGRAPH NO.7



PHOTOGRAPH NO. 8

APPENDIX D
HYDROLOGY AND HYDRAULICS ANALYSES

HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE

NAME OF DAM: Ross Pond Dam

PROBABLE MAXIMUM PRECIPITATION (PMP) = 22.2 INCHES/24 HOURS⁽¹⁾

STATION	1	2	3	4	5
Station Description	Ross Pond	Ross Pond Dam			
Drainage Area (square miles)	0.98	-			
Cumulative Drainage Area (square miles)	0.98	0.98			
Adjustment of PMP for Drainage Area (Z) ⁽²⁾	93%	-			
6 Hours	117	-			
12 Hours	127	-			
24 Hours	136	-			
48 Hours	142	-			
72 Hours	145	-			
Snyder Hydrograph Parameters					
Zone ⁽³⁾	11A	-			
C_p/C_t ⁽⁴⁾	0.62/1.5	-			
L (miles) ⁽⁵⁾	1.42	-			
L_{ca} (miles) ⁽⁵⁾	0.57	-			
$t_p = C_t(L-L_{ca})^{0.3}$ (hours)	1.41	-			
Spillway Data		PRIMARY	EMERGENCY		
Crest Length (ft)	-	60	50		
Freeboard (ft)	-	3.0	1.3		
Discharge Coefficient	-	3.0	2.65		
Exponent	-	1.5	1.5		

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 40, U.S. Weather Bureau, 1965.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.

L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

STORAGE VS. ELEVATION

ELEVATION	ΔH, FEET	AREA (acres) ⁽¹⁾	ΔVOLUME (acre-feet) ⁽²⁾	STORAGE (acre-feet)
1416		51.4		0
1420	4	60.6	223.8	223.8
1440	20	86.3	1461.4	1685.2

(1) Planimetered from USGS maps.

(2) $\Delta V_{\text{Volume}} = \Delta H/3 (A_1 + A_2 + \sqrt{A_1 A_2})$.

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS								
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
				.20	.30	.40	.50	.60	.70	.80	.90	1.00
HYDROGRAPH AT	1	.98	1	573.	860.	1146.	1433.	1719.	2006.	2293.	2579.	2866.
	(2.54)	(16.23)	(24.35)	(32.46)	(40.58)	(48.69)	(56.81)	(64.92)	(73.04)	(81.15)
ROUTED TO	2	.98	1	378.	626.	903.	1188.	1486.	1792.	2127.	2435.	2745.
	(2.54)	(10.72)	(17.73)	(25.57)	(33.65)	(42.08)	(50.74)	(60.24)	(68.96)	(77.74)

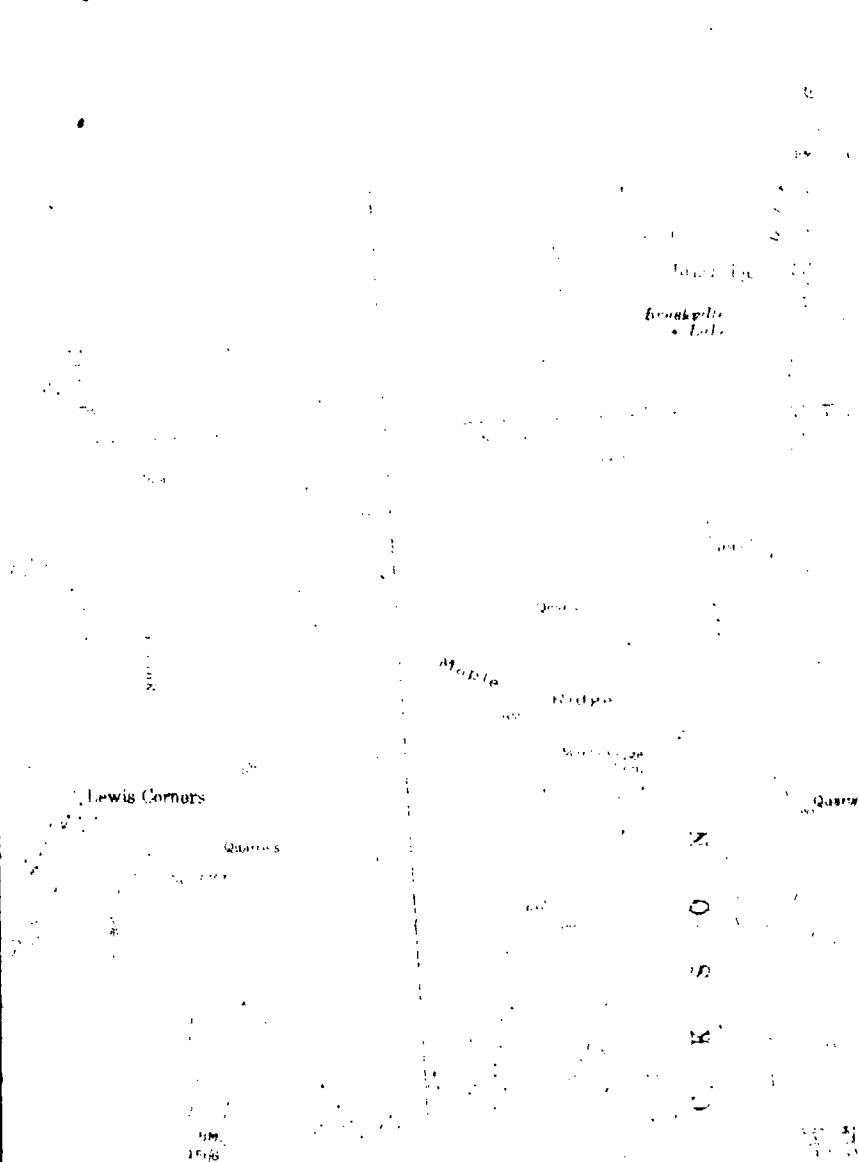
PLAN 1

OVERTOPPING ANALYSIS

APPENDIX E

PLATES

DRAWN BY	ACS	CHECKED BY	8-10-81	DRAWING 80-556-B58 NUMBER 8/1/81
	12-15-80	APPROVED BY	JMP	



ROSS POND DAM

REFERENCES:

1. U.S.G.S. SUSQUEHANNA, PA. QUADRANGLE
PHOTOREVISED 1978, SCALE 1:24000
2. U.S.G.S. GREAT BEND, PA-NY. QUADRANGLE
PHOTOREVISED 1978, SCALE 1:24000

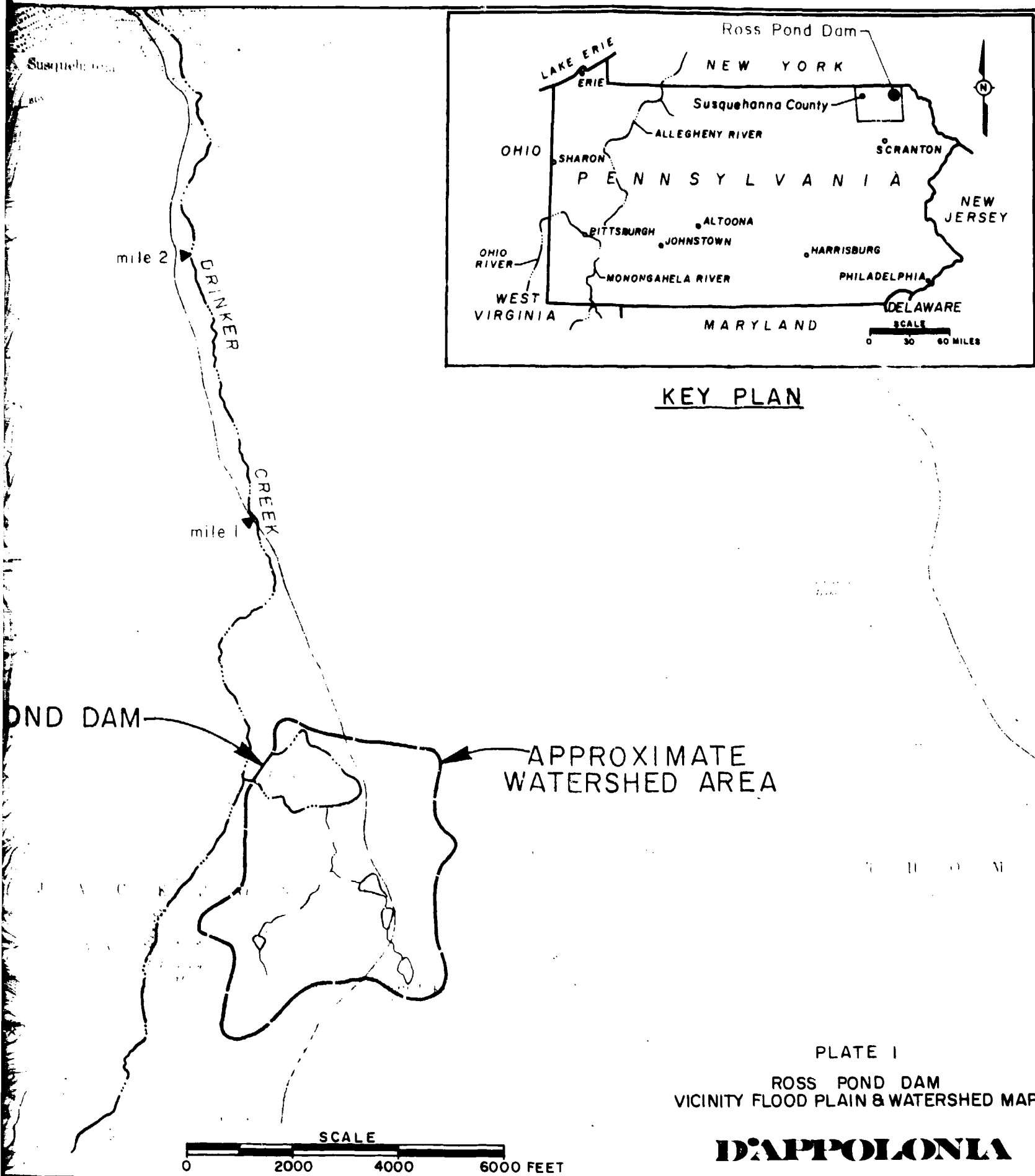
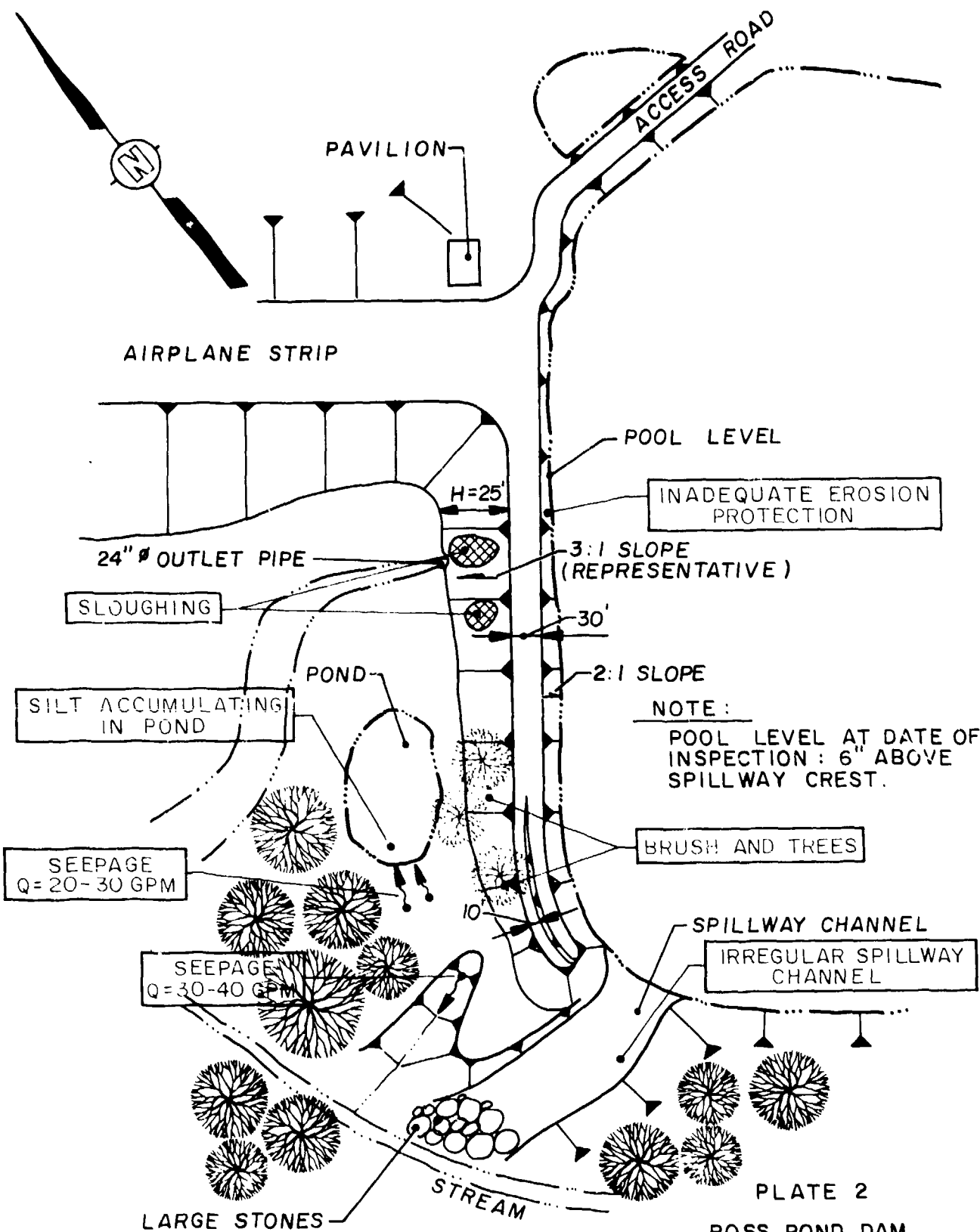


PLATE I
ROSS POND DAM
VICINITY FLOOD PLAIN & WATERSHED MAP

D'APPOLONIA

DRAWING 80-556-A46
 3-10-81
 3/10/81
 JHP
 CHECKED BY
 8-10-81
 APPROVED BY
 ACS
 DRAWN BY

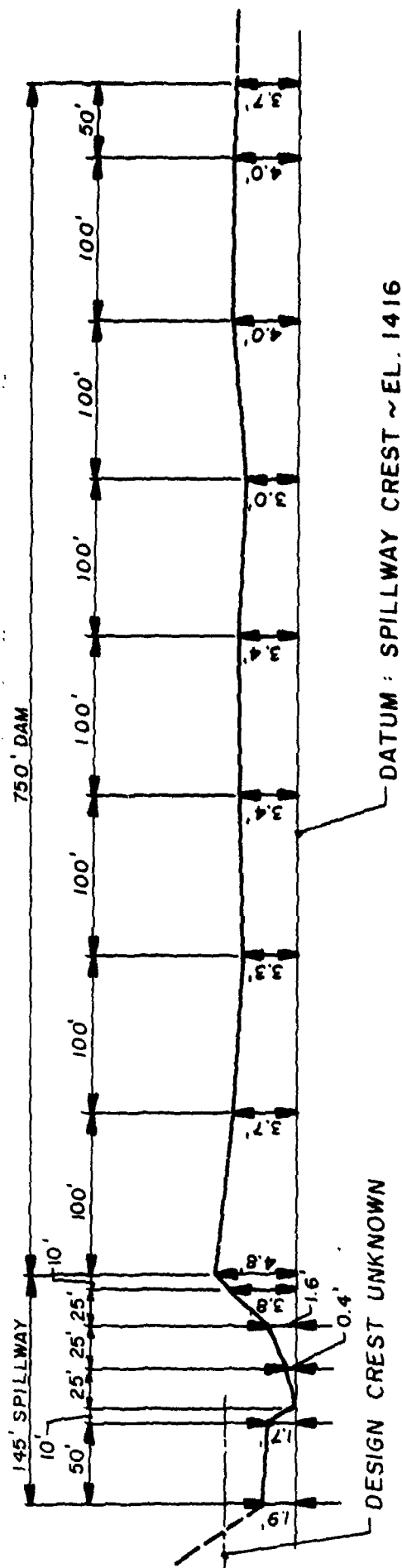


ROSS POND DAM
 GENERAL PLAN
 FIELD INSPECTION NOTES
 FIELD INSPECTION DATE: MAR. 23, 1981

D'APOLONIA

NOT TO SCALE

DRAWN BY	ACS	CHECKED BY	PC	8-10-81	DRAWING NUMBER	80-556-A47
	4-7-81	APPROVED BY	JAP	8/10/81		



DAM CREST PROFILE (LOOKING DOWNSTREAM)

NOTES:

1. DAM CREST WAS SURVEYED RELATIVE TO SPILLWAY CREST
2. DATUM ELEVATION WAS INTERPOLATED FROM U.S.G.S. MAPS, THEREFORE IS APPROXIMATE.

PLATE 3

ROSS POND DAM
DAM CREST SURVEY
FIELD INSPECTION DATE: MAR. 23, 1981

D'APPOLONIA

APPENDIX F
REGIONAL GEOLOGY

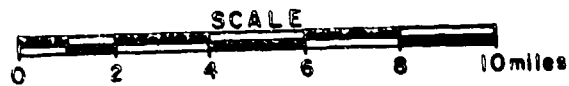
REGIONAL GEOLOGY ROSS POND DAM

The Ross Pond Dam is located in the glaciated low plateaus section of the Appalachian Plateau physiographic province, which is characterized as a mature glaciated plateau of moderate relief.

The geologic structure consists of a series of northeast trending folds (approximately N70°E) which plunge gently to the southwest. The dip of the limbs of the folds in the vicinity of Ross Pond Dam is less than two degrees, with the southeast limb slightly steeper than the northwest limb. The dam is located north of the Raysville Syncline. In general, the discontinuity trends are northeast and northwest.

The stratigraphy consists of glacial till which ranges in thickness from a few inches to approximately 200 feet. The glacial till is underlain by the Devonian Catskill Formation, which is approximately 1,800 feet thick in this area. The Catskill Formation is continental in origin, consisting of red shale and cross-bedded red and green sandstone and siltstone. The shale strata tend to weather rapidly when exposed.

2-17-B DRAWING 80-556-A2
 2-17-A NUMBER 80-556-A2
 CHECKED BY JHP
 APPROVED BY JHP
 ACS
 1-2-81
 DRAWN BY



GEOLOGY MAP

REFERENCE:
 GEOLOGIC MAP OF PENNSYLVANIA PREPARED
 BY COMMONWEALTH OF PENNA. DEPARTMENT OF
 ENVIRONMENTAL RESOURCES, DATED: 1960
 SCALE 1:250,000

D'APPOLONIA

DRAWING 80-556-A4
NUMBER 2-17-81

CHECKED BY JSC
APPROVED BY JSC
ACS
1-2-81

DRAWN BY

PENNSYLVANIAN APPALACHIAN PLATEAU



Allegheny Group

Cyclic sequences of sandstone, shale, limestone and coal; numerous commercial coals; limestones thicken westward; Vanport Limestone in lower part of section; includes Freeport, Kittanning, and Clarion Formations.



Pottsville Group

Predominantly sandstones and conglomerates with thin shales and coals; some coals mineable locally.

ANTHRACITE REGION



Post-Pottsville Formations

Brown or gray sandstones and shales with some conglomerate and numerous mineable coals.



Pottsville Group

Light gray to white, coarse grained sandstones and conglomerates with some mineable coal; includes Sharp Mountain, Schuylkill, and Tumbling Run Formations.

MISSISSIPPIAN



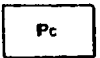
Mauch Chunk Formation

Red shales with brown to greenish gray flaggy sandstones; includes Greenbrier Limestone in Fayette, Westmoreland, and Somerset counties; Loganoma Limestone at the base in southwestern Pennsylvania.



Pocono Group

Predominantly gray, hard, massive, cross-bedded conglomerate and sandstone with some shale; includes in the Appalachian Plateau: Burgoon, Shenango, Cuyahoga, Cusawago, Corry, and Knapp Formations; includes part of "Onaway" of M. L. Fuller in Potter and Tioga counties.



Conemaugh Formation

Cyclic sequences of red and gray shales and sandstones with thin limestones and coals; massive Mahoning Sandstone commonly present at base; Ames Limestone present in middle of sections; Brush Creek Limestone in lower part of section.

DEVONIAN UPPER

CENTRAL AND EASTERN PENNSYLVANIA



Onaway Formation

Brownish and greenish gray, fine and medium grained sandstones with some shales and scattered calcareous lenses; includes red shales which become more numerous eastward. Relation to type Onaway not proved.



Catskill Formation

Chiefly red to brownish shales and sandstones; includes gray and greenish sandstone tongues named Elk Mountain, Honesdale, Shohola, and Delaware River in the east.



Marine beds

Gray to olive brown shales, graywackes, and sandstones; contains "Chemung" beds and "Portage" beds including Burket, Brallier, Harrell, and Trimmers Rock; Tully Limestone at base.



Susquehanna Group

Barbed line is "Chemung-Catskill" contact of Second Pennsylvania Survey County reports; bars on "Chemung" side of line.

GEOLOGY MAP LEGEND

REFERENCE:

GEOLOGIC MAP OF PENNSYLVANIA PREPARED
BY COMMONWEALTH OF PENNA., DEPARTMENT OF
ENVIRONMENTAL RESOURCES, DATED: 1960
SCALE 1:250,000

D'APPOLONIA